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Indian Standard

SPECIFICATION FOR PROCESSED DISK RECORDS

UDC 661·85

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

***April* 1980**

AMENDMENT NO. 1 JANUARY 1985

TO

IS : 9305-1979 SPECIFICATION FOR PROCESSED DISK RECORDS

Alterations

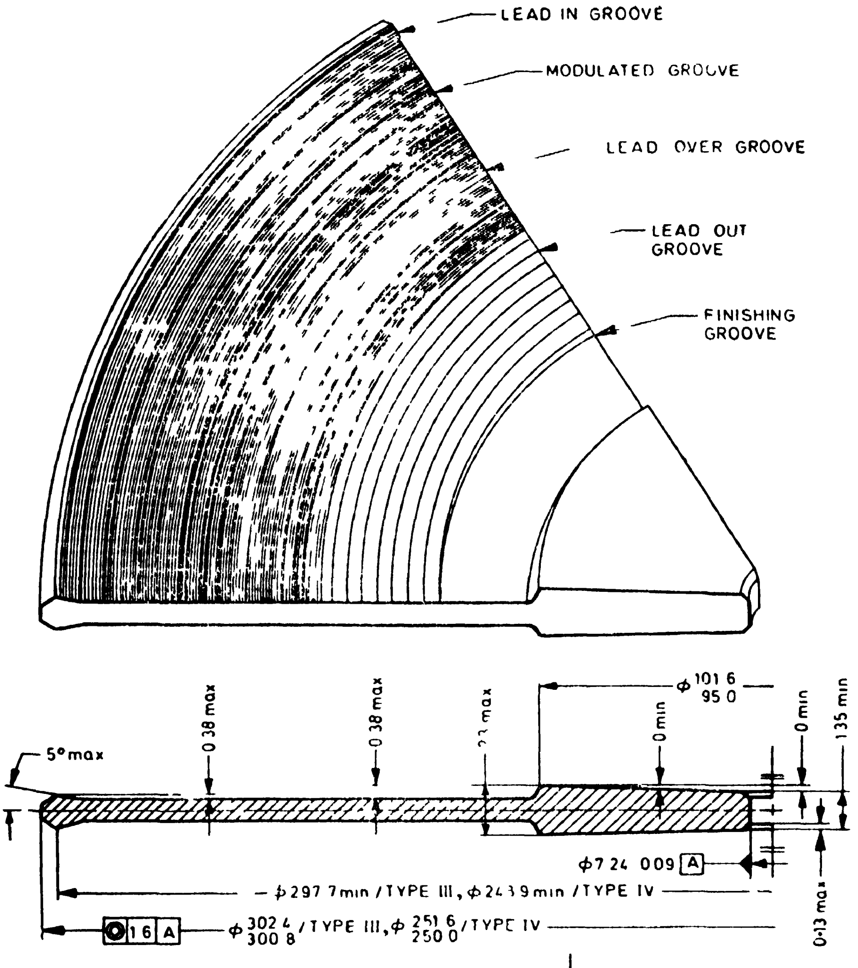
(*Page* 7, *clause* **5.7.1**) — Substitute the following for the existing clause:

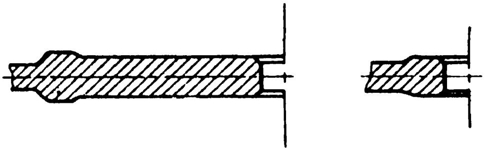
' **5.7.1** For all types of records the maximum thickness of any part shall not exceed 2·3 mm. '

(*Page* 8, *Fig.* 1) — Substitute the figure given on page 2 for the existing figure.

(*Page* 8, *clause* **5.8.2.2**) - Delete.

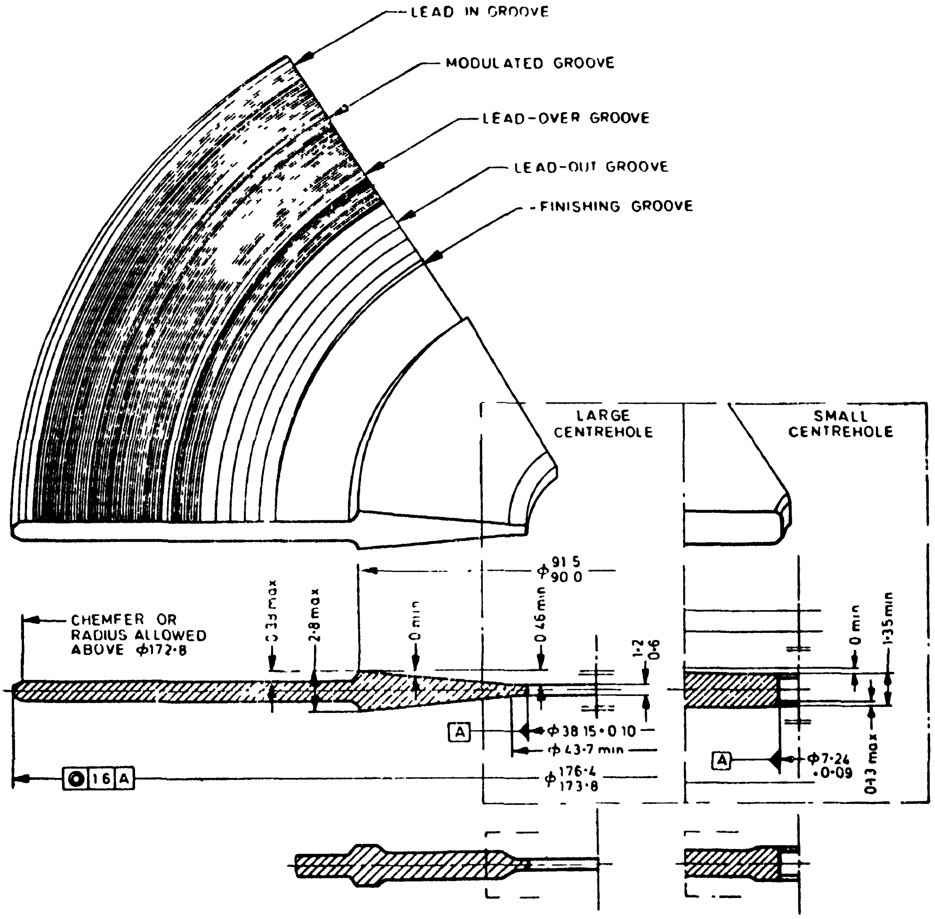
(*Page* 9, *Fig.* 2) — Substitute the figure given on page 3 for the existing figure.





Other examples of possible label-area executions.

FIG 1 TYPES III AND IV WITH RAISED RIM OR RAISED LABEL OR BOTH



Other examples of possible label-area executions.

NOTE 1 — A small centre hole disk may have an optional push-out centre that, when removed, leaves the large centre hole dimensions, both configurations have to fulfil the requirements of the figure.

NOTE 2 — An optional push-out centre shall have a closed structure within a diameter of 16 mm concentric with the centre hole.

FIG. 2 TYPES V AND VI

(LTDC 23)

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Indian Standard

SPECIFICATION FOR PROCESSED DISK RECORDS

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(*Continued on page* 2)

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(*Continued from page* 1)

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Indian Standard

SPECIFICATION FOR PROCESSED DISK RECORDS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 18 September 1979, after the draft finalized by the Recording Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 This standard specifies the dimensional and other characteristics of processed mono and stereo disk records necessary to secure inter-changeability.

0.3 While preparing this standard, assistance has been derived from IEC Publication 98-1964; Processed disk records and reproducing equipment issued by International Electrotechnical Commission.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the dimensional and other characteristics of processed mono and stereo disk records.

2. TERMINOLOGY

2.1 For the purpose of this standard, the following terms and definitions in addition to those covered in IS : 1885 (Part XLVIII/Sec 1)-1978† and IS : 1885 (Part XLVIII/Sec 2)-1978‡ shall apply.

2.1.1 *Recording Characteristic* — The curve of recorded velocity *versus* frequency that would be obtained when recording various frequencies with

---

*Rules for rounding off numerical values (*revised*).

†Electrotechnical vocabulary : Part XLVIII Recording, Section 1 Tape recording.

‡Electrotechnical vocabulary : Part XLVIII Recording, Section 2 Disk recording.

fixed voltage level applied to that point in the chain where the normal signal has the frequency characteristic that it is desired subsequently to reproduce.

NOTE 1 — This point may not always be at the input or output of an amplifier, but it is the point to which a monitor amplifier and loudspeaker should be connected.

NOTE 2 — Recording characteristics are normally plotted with frequency as abscissa on a logarithmic scale and with velocity as ordinate on a logarithmic scale (*see* IS : 8159-1976*).

2.1.2 *Reproducing Characteristics* — The curve of output voltage *versus* frequency that would be obtained when moving the reproducing stylus with constant velocity at various frequencies.

NOTE — Reproducing characteristics are normally plotted with frequency as abscissa on a logarithmic scale and with voltage as ordinate on a logarithmic scale (*see* IS : 8159-1976*).

3. TYPES

3.1 The following types of record which shall be standard are given in Table 1.

TABLE 1 TYPE OF RECORD

TYPE OF RECORD (1)	APPROXIMATE DIAMETER (2)	APPROXIMATE SPEED OF ROTATION (3)	TYPE OF GROOVE (4)	MONOPHONIC (M) OR STEREOPHONIC (S)* (5)
	mm	rev/min		
I	300	78	Coarse	M only
II	250	78	Coarse	M only
III	300	33	Fine	M or S
IV	250	33	Fine	M or S
V	175	33	Fine	M or S
VI	175	45	Fine	M or S

NOTE — The dimensions of coarse and fine grooves are stated in **5.1**.

*The stereophonic type of fine groove is described in **4.3**.

4. GENERAL REQUIREMENTS

4.1 Direction of Rotation — The direction of rotation shall be clockwise when viewed from the side being recorded or reproduced.

4.2 Direction of Recording — Records shall be so made that the direction of travel of the pick-up is towards the centre.

---

*Scales and sizes for plotting frequency characteristics and polar diagrams.

4.3 Stereophonic Fine Groove

4.3.1 *Nature of Groove* — The stereophonic groove shall carry two channels of information. The two channels shall be recorded in such a manner that they can be reproduced by movement of a reproducing stylus tip in two directions at 90° to each other and at 45° to a radial line through the stylus tip and the centre of the record. The reproducing stylus tip motion shall be tangential to or lie in a plane through the stylus tip and the record centre, preferably inclined at an angle of 20 ± 5° clockwise to the normal to the record surface through the stylus tip, as viewed from the record centre.

NOTE — In practice, angles of between 0° and 25° may be encountered.

4.3.2 *Channel Orientation* — The groove shall be recorded for reproduction with the right-hand loudspeaker(s), as viewed from the audience, actuated by movement of the groove wall which is further away from the centre of the record.

4.3.3 *Channel Phasing* — The phasing of the two recorded signals shall be suitable for reproduction on equipment so connected that movement of the reproducing stylus tip parallel to the record surface (as with a monophonic record) produces in-phase sound pressures at the right- and left-hand loudspeakers.

4.3.4 *Channel Levels* — The levels of the two recorded signals shall be suitable for reproduction on equipment so connected that movement of the reproducing stylus tip parallel to the record surface (as with a monophonic record) produces equal sound pressures at the right- and left-hand loudspeakers.

4.4 Speed of Rotation — Records shall be recorded for reproduction at one of the following speeds:

Type of Record	*Speed of Rotation*
	50 Hz Electric Supplies
I, II	77·92 rev/min ± 0·5 percent
VI	45·11 rev/min ± 0·5 ,,
III, IV, V	33·⅓ rev/min ± 0·5 ,,

5. DIMENSIONAL REQUIREMENTS

5.1 Groove Dimensions

5.1.1 The groove dimensions shall be as follows.

5.1.1.1 *Coarse groove*

a) Minimum top width	0·15 mm
b) Maximum bottom radius	0·025 mm
c) Included angle	90° approx

5.1.1.2 *Fine groove*

a) Minimum top width (monophonic only)	0·051 mm
b) Maximum bottom radius	0·008 mm
c) Included angle	90° approx

On stereophonic records, the instantaneous groove width should preferably be not less than 0·025 mm. The average groove width should preferably be not less than 0·035 mm.

5.2 Diameter of Disk Records — The diameter of records shall be as follows:

Type of Record	*Diameter of Record*
I, III	301·6 ± 0·8 mm
II, IV	250·8 ± 0·8 mm
V, VI	174·6 ± 0·8 mm

5.3 Recorded Surface

5.3.1 *Plain Groove at Start of Recorded Surface* — The recorded surface shall start with at least one turn of plain groove.

5.3.2 *Outer Diameter of Recorded Surface* — The maximum outer diameter of the recorded surface shall be as follows:

Type of Record	*Maximum Outer Diameter of Recorded Surface*
I, III	292·6 mm
II, IV	241·8 mm
V, VI	168·3 mm

5.3.3 *Marker Space* — The groove pitch in a marker space shall not exceed 1·6 mm. A marker space should preferably not occur at a diameter of less than 127 mm.

5.4 Lead-in Groove — For fine groove records, the pitch of the lead-in groove shall be:

Max 1·6 mm
Min 0·8 mm

5.5 Lead-out Groove

5.5.1 *Pitch of Lead-out Groove* — The pitch of the lead-out groove shall be 6·4 ± 3·2 mm.

5.5.2 *Width of Lead-out Groove* — For fine groove records, the top width of the lead-out groove shall increase to a minimum of 0·076 mm when the pitch exceeds 6·4 mm.

5.5.3 *Number of Turns of Lead-out Groove* — On all records having a concentric finishing groove the lead-out groove shall have at least one complete turn. On all records having an eccentric finishing groove the lead-out groove shall have at least a half turn.

5.6 Finishing Groove

5.6.1 The diameter of the finishing groove shall be as follows:

TABLE 2 DIAMETER OF FINISHING GROOVE

TYPE OF RECORD (1)	DIAMETER OF FINISHING GROOVE (2)	CONCENTRIC OR ECCENTRIC (3)
I, II	85·7 ± 0·4 mm	Eccentric*
I, II	86 ± 1 mm	Concentric
III, IV	106·4 ± 0·8 mm	Concentric
V, VI	98·4 $^{+0}_{-2}$ mm	Concentric

NOTE — The eccentricity of an eccentric finishing groove is the distance of its centre from that of the groove spiral.

*The eccentricity shall be 3·2 ± 0·4 mm.

5.7 Thickness of Disk Records

5.7.1 For all types of record, the thickest part shall not exceed 2·3 mm.

5.7.2 If a raised rim or a raised label area or both are used for records of Type III and IV, the dimensions shall be as shown in Fig. 1.

5.7.3 For records of Type V and VI, the dimensions shall be as shown in Fig. 2.

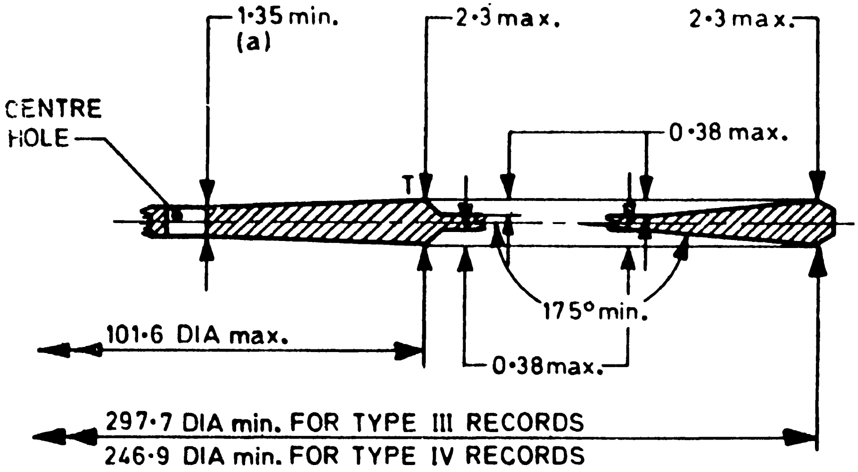
5.8 Centre Hole of Disk Records

5.8.1 *Diameter of Centre Hole*

5.8.1.1 For all records except those of Types V and VI using the large centre hole, the diameter of the centre hole shall be 7·24 mm H 11.

5.8.1.2 The corresponding maximum and minimum values are:

Max 7·33 mm
Min 7·24 mm



(*a*) This thickness shall not exceed that at *T*.

Figure not to scale.

All dimensions in millimetres.

FIG. 1 THICKNESS OF DISK RECORDS — TYPES III AND IV WITH RAISED RIM OR RAISED LABEL AREA OR BOTH

5.8.1.3 The edges of the hole shall be free from burrs, and any rounding or countersinking shall not exceed 0·13 mm in depth.

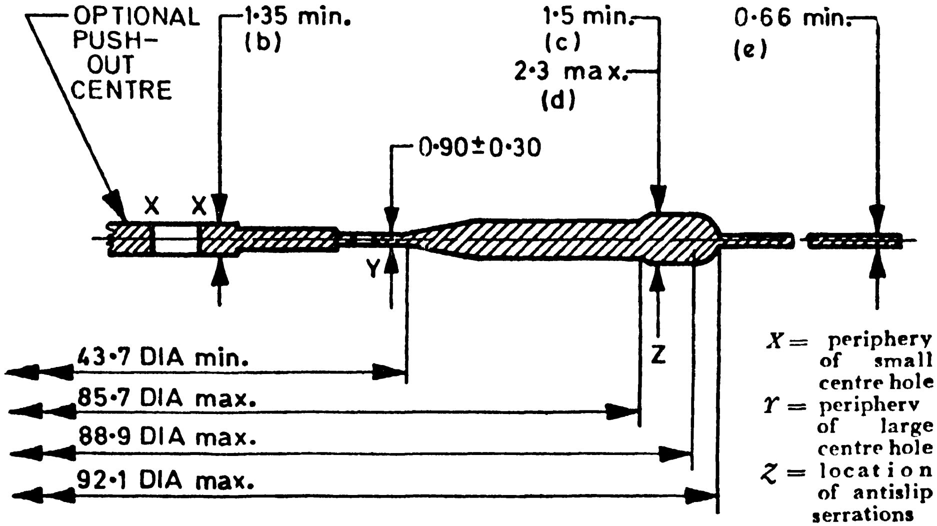
5.8.1.4 If the large centre hole is used on records of Type V and VI, its diameter shall be 38·20 ± 0·05 mm.

5.8.2 *Eccentricity of Centre Hole*

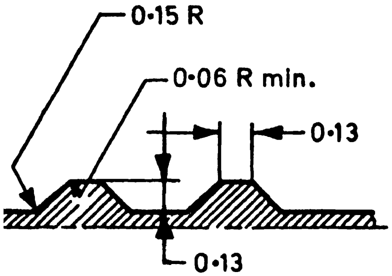
5.8.2.1 *Eccentricity to groove spiral* — The distance of the centre of the centre hole from the centre of the groove spiral shall not exceed 0·2 mm.

5.8.2.2 *Eccentricity to record periphery* — The distance of the centre of the centre hole from the centre of the record periphery shall not exceed 0·8 mm.

5.9 Unbalance of Disk Records — The centre of gravity of disk records shall not fall outside an 8 mm diameter circle concentric with the centre hole.



X = periphery of small centre hole
Y = periphery of large centre hole
Z = location of antislip serrations



160 serrations on each side of record. Approximate dimensions of anti-slip serrations.

(*b*) This thickness shall not exceed that at *Z* minus thickness of serrations.

(*c*) Excluding thickness of serrations.

(*d*) Including thickness of serrations.

(*e*) This thickness shall not exceed that at *Z* minus thickness of serrations, if any.

(*f*) *Z*-*Y* shall not be less than 0 9 mm.

NOTE — In the direction of the axis of rotation, the zone within the diameter of (43·7mm) should be positioned as symmetrically as possible in relation to the thickest part of the record *Z*.

Figure not to scale.

All dimensions in millimetres.

FIG. 2 THICKNESS OF DISK RECORDS TYPES-V AND VI

6. ELECTRICAL REQUIREMENTS

6.1 Recording Characteristics

6.1.1 *Statement of Recording Characteristic*

6.1.1.1 With constant voltage applied to that point in the recording chain where the normal signal has the frequency characteristic that it is desired subsequently to reproduce, the curve of recorded velocity *versus* frequency shall be that which results from the combination of the following three curves:

a) One rising with frequency in conformity with the admittance of a parallel combination of a capacitance and a resistance having a time-constant of t_1,

b) One rising with frequency in conformity with the admittance of a series combination of a capacitance and a resistance having a time-constant of t_2, and

c) One falling with rise of frequency in conformity with the impedance of a series combination of a capacitance and a resistance having a time-constant of t_3.

6.1.1.2 The combined curve is defined by:

$$\mathcal{N}(\text{dB}) = 10 \log \left(1 + 4\pi^2 f^2 t_1^2 \right) - 10 \log \left(1 + \frac{1}{4\pi^2 f^2 t_2^2} \right) + 10 \log \left(1 + \frac{1}{4\pi^2 f^2 t_3^2} \right)$$

where f is the frequency in hertz (cycles per second) and t_1, t_2 and t_3 are as follows:

Time-Constant	*Coarse Groove*	*Fine Groove*
t_1	50×10^{-6} seconds	75×10^{-6} seconds
t_2	450×10^{-6} seconds	318×10^{-6} seconds
t_3	$3\,180 \times 10^{-6}$ seconds	$3\,180 \times 10^{-6}$ seconds

These curves are shown in Fig. 3 and 4, and the approximate relative values are shown in Table 3.

NOTE 1 — The dimensions of coarse and fine grooves are stated in **6.1**.

6.2 Recording Characteristic Tolerances — Records shall be recorded to a smooth characteristic lying within ± 2 dB of the appropriate characteristic specified in **7.1** in the frequency range from 50 Hz to 10 kHz, taking as a reference point the value at 1 kHz.

NOTE — The difference between the recording characteristics of the two channels of a stereophonic record should be less than is implied by the above tolerances.

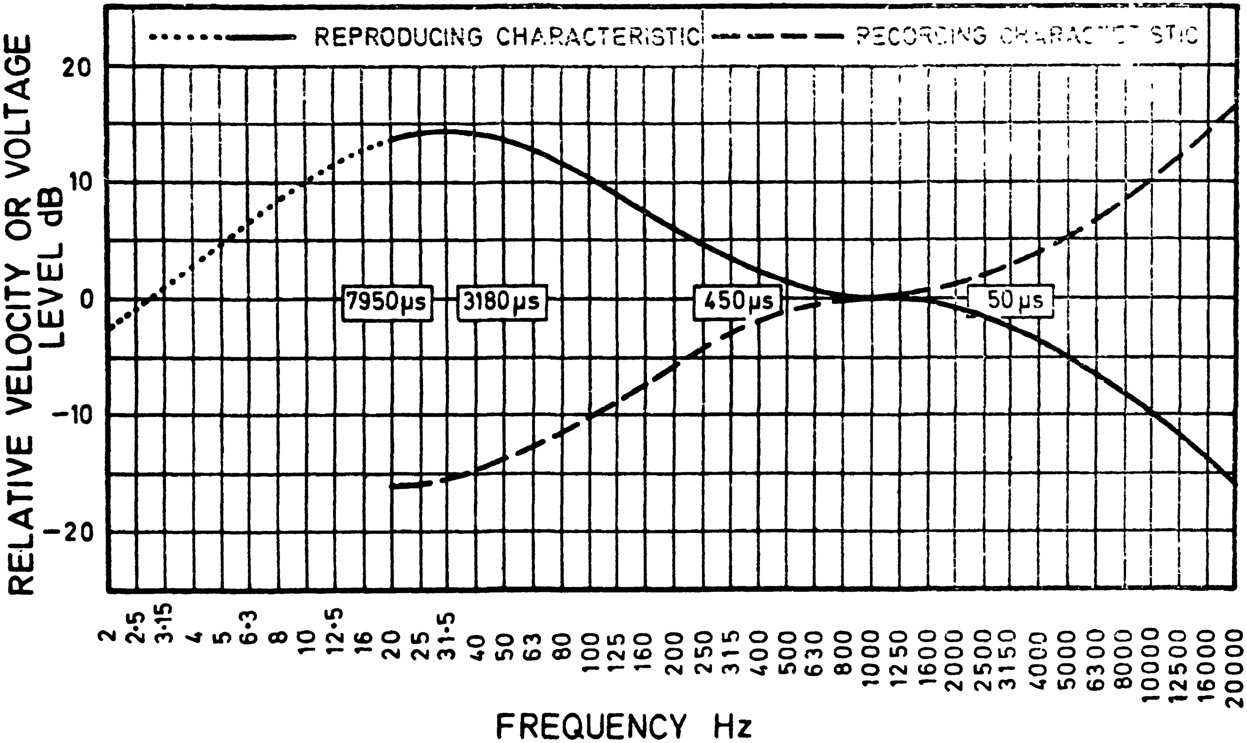


Fig. 3 Characteristics for Coarse Groove Disk Records

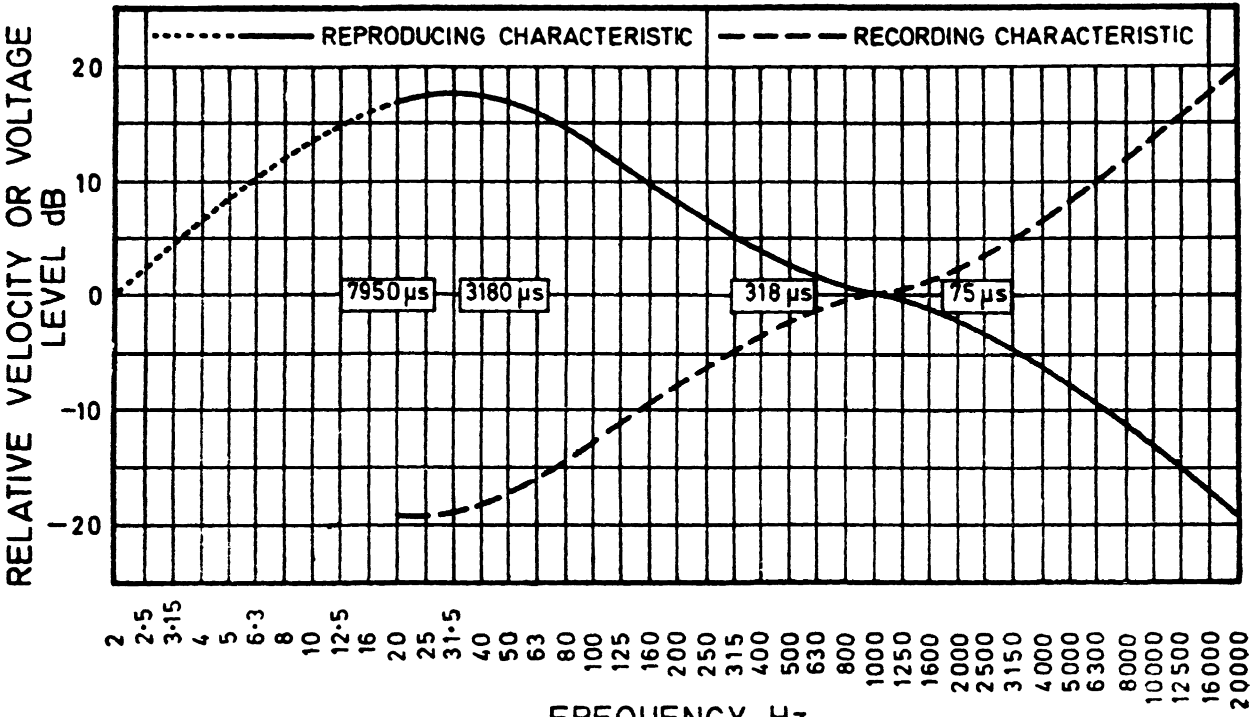


Fig. 4 Characteristic for Fine Groove Disk Records

TABLE 3 RECORDING CHARACTERISTICS

(*Clause* 6.1.1.2)

Recording — Relative Level dB		Frequency Hz	Reproducing — Relative Level dB	
Coarse Groove	Fine Groove		Coarse Groove	Fine Groove
(1)	(2)	(3)	(4)	(5)
—	—	2	— 3·2	— 0·2
—	—	2·5	— 1·3	+ 1·8
—	—	3·15	+ 0·7	+ 3·7
—	—	4	+ 2·7	+ 5·7
—	—	5	+ 4·5	+ 7·6
—	—	6·3	+ 6·4	+ 9·4
—	—	8	+ 8·2	+11·2
—	—	10	+ 9·7	+12·8
—	—	12·5	+11·1	+14·1
—	—	16	+12·4	+15·4
—16·3	—19·3	20	+13·3	+16·3
—16·0	—19·0	25	+13·8	+16·8
—15·5	—18·5	31·5	+11·9	+17·0
—14·8	—17·8	40	+13·8	+16·8
—14·0	—16·9	50	+13·3	+16·3
—12·9	—15·9	63	+12·5	+15·4
—11·6	—14·5	80	+11·3	+14·2
—10·2	—13·1	100	+10·1	+12·9
— 8·8	—11·6	125	+ 8·7	+11·5
— 7·2	— 9·8	160	+ 7·1	+ 9·7
— 5·8	— 8·2	200	+ 5·7	+ 8·2
— 4·5	— 6·7	250	+ 4·5	+ 6·7
— 3·3	— 5·2	315	+ 3·3	+ 5·2
— 2·3	— 3·8	400	+ 2·3	+ 3·8
— 1·5	— 2·7	500	+ 1·5	+ 2·6
— 0·9	— 1·6	630	+ 0·9	+ 1·6
— 0·4	— 0·8	800	+ 0·4	+ 0·8
0	0	1 000	0	0
+ 0·4	+ 0·7	1 250	+ 0·4	— 0·8
+ 0·9	+ 1·6	1 600	— 0·9	— 1·6
+ 1·4	+ 2·6	2 000	— 1·4	— 2·6
+ 2·1	+ 3·7	2 500	— 2·1	— 3·7
+ 3·0	+ 5·0	3 150	— 3·0	— 5·0
+ 4·2	+ 6·6	4 000	— 4·2	— 6·6
+ 5·5	+ 8·2	5 000	— 5·5	— 8·2
+ 7·0	+10·0	6 300	— 7·0	—10·0
+ 8·7	+11·9	8 000	— 8·7	—11·9
+10·5	+13·7	10 000	—10·5	—13·7
+12·2	+15·6	12 500	—12·2	—15·6
+14·3	+17·7	16 000	—14·3	—17·7
+16·2	+19·6	20 000	—16·2	—19·6

7. LABEL INFORMATION

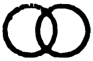
7.1 The label shall give at least the information given in **7.1.1** and **7.1.2**.

7.1.1 *Technical Information*

a) Approximate speed of rotation, and

b) Type of groove.

NOTE 1 — The label of fine groove stereophonic recording shall be clearly marked with the symbol



NOTE 2 — Monophonic records may be distinguished by a marking in the form of a square for coarse groove, a triangle for fine groove.

7.1.2 *General Information*

a) Title(s);

b) Performer(s);

c) Composer(s);

d) Sides, if more than one, for example, side 5 of 8; and

e) Catalogue number.

8. MARKING

8.1 Each disk record shall be marked with the following:

a) Manufacturer's name or trade-mark,

b) Model and type number, and

c) Country of manufacture.

8.2 The disk record may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

ON

RECORDING

IS:	
1885 (Part III/Sec 3)-1967	Electrotechnical vocabulary: Part III Acoustics, Section 3 Sound recording and reproduction
2032 (Part XII)-1969	Graphical symbols used in electrotechnology: Part XII Electro-acoustic transducers and recording and reproducing systems
3956-1967	Dimensions of spools for magnetic tapes for sound recording and reproduction
4377-1967	General requirements for magnetic tapes for sound recording and reproduction
4479-1967	Methods of measurements on magnetic tapes for sound recording and reproduction
4480 (Part I)-1967	Magnetic tapes for sound recording and reproduction: Part I Domestic grade
4480 (Part II)-1974	Magnetic tapes for sound recording and reproduction: Part II Professional grade
6370-1971	Tape cassettes for domestic use
6391-1971	Magnetic and ceramic phonograph pick-ups
7068-1973	6·25 mm calibration tape
7594 (Part I)-1978	Magnetic sound tape recording and reproducing equipment (cassette): Part I Methods of measurement
7594 (Part II)-1975	Magnetic sound tape recording and reproducing equipment (cassette): Part II Domestic type,
8152-1976	Method of measurement of speed fluctuations in sound recording and reproducing equipment
8234-1976	Spools for magnetic tapes for sound recording and reproduction
8655 (Part I)-1975	Magnetic sound tape recording and reproducing equipment (reel-to-reel): Part I Methods of measurement
8655 (Part III)-1977	Magnetic sound tape recording and reproducing equipment (reel-to-reel): Part III Professional type

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Patliputra Industrial Estate	PATNA 800013	6 28 08
Hantex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 695001	32 27

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